

Maintaining, Cleaning and Storing Ground Sprayer Equipment

By Gregory Johnson and Roy Linn*

Maintenance and cleaning are essential for maximum performance of spray equipment and pesticides.

A properly maintained ground sprayer will produce more accurate and effective pesticide applications and provide more trouble-free hours of operation. Regular preventative maintenance will assure that components subject to wear are replaced before they fail.

In contrast, a poorly-maintained sprayer may result in too much or too little pesticide applied, spray gaps or overlaps, environmental hazards, crop and livestock injury, and equipment breakdown when you are busiest. A pesticide mixture left in a spray tank for an extended period may create problems such as reduced pesticide performance or pesticide settling and blocking strainers and screens. Pesticides left in an unattended sprayer are a hazard to people, wildlife or the environment. Pesticide residue in a spray tank will contaminate subsequent pesticide mixes and affect pesticide performance. Trace amounts of the wrong pesticide in a spray tank may cause injury to crops and livestock in subsequent treatments.

This MontGuide describes procedures for maintaining, cleaning, storing, and winterizing ground sprayers following a pesticide treatment.

Maintaining Sprayer Equipment

Maintenance of pesticide application equipment includes regular inspection of the spray tank, pump, hoses, line strainers, pressure gauge, fittings/connections, nozzle tips and strainers. A check of the spray equipment should be made following extended storage and before each use. ***Wear protective clothing when making a maintenance check. This includes hat, coveralls, rubber gloves, rubber boots and eye protection.***

Spray Tank—Spray tanks are made of either stainless or galvanized steel, fiberglass or plastic, i.e. polyethylene or polypropylene. These materials are non-absorptive so no pesticide residues will be left in them after being cleaned. However, the inside of fiberglass tanks, if scratched, will absorb pesticides. These scratches can be filled with resin to reduce contamination of subsequent tank mixes. Cracks and

chips in the epoxy coating of galvanized tanks must be repaired with epoxy material; otherwise the exposed metal may corrode. Periodically check tanks for cracks, rust or corrosion which will weaken the tank and eventually develop into a leak.

Pump and Pump Seals—The pump can be considered the heart of the spray system and needs to be in good working condition. Pump seals, 'O' rings or cup washers of leather or synthetic material may dry out and shrink if the sprayer has not been used for an extended period. This can result in leaks around the pump or inefficient pumping. Seals may also be affected by some solvents used in pesticide formulations. These solvents may cause seals to swell causing difficulty in pump operation.

Hoses—Hoses that are cracked or leaking should be replaced.

Remember: hoses used to apply pesticides can never be completely decontaminated. There will always be some pesticide residue left in them. Those that are replaced must be properly disposed of and not reused for any purpose.

Line strainers and screens—These are used to filter out debris and foreign particles that can plug nozzles and reduce sprayer performance. For this reason, strainers and screens should always be used when the equipment is in operation.

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Table 1: Cleaning Agents and Rates for Detoxifying Sprayers**

	25 gallons Cleaning Solution	2.5 gallons Cleaning Solution	Cleaning Instructions
INSECTICIDES			
Organophosphates (e.g. malathion, Cygon Lorsban, Penncap M)	1 qt household ammonia + 1/4 lb powder detergent*	1 cup household ammonia + 1 Tblsp powder detergent*	Agitate solution 10-15 minutes, flush solution through system and rinse with clean water.
Carbamates (e.g. Sevin, Furadan)			
Pyrethroids (e.g. Pounce, Ambush)			
FUNGICIDES			
	1 qt household ammonia + 1/4 lb powder detergent*	1 cup household ammonia + 1 Tblsp powder detergent*	Agitate solution 10-15 minutes, flush solution through system and rinse with clean water.
HERBICIDES			
Hormone herbicides, salt or amine formulations (e.g., 2,4-D, dicamba, MCPA)	1 qt household ammonia	1/2 cup household ammonia	Agitate solution 10-15 minutes, flush small amount through system and let remainder stand overnight. Flush and rinse with clean water.
	<i>Or</i>	<i>Or</i>	
	1/2 lb fine activated charcoal + 1/2 cup powder detergent*	2 Tblsp fine activated charcoal + 1 to 2 oz powder detergent*	Agitate solution, operate sprayer for 2 minutes, let remainder stand 10 minutes, then flush sprayer. Rinse with clean water.
Hormone herbicides ester formulations (e.g. 2,4-D, brush killers)	1 lb washing soda + 1 gal kerosene + 1/4 lb powder detergent*	4 oz washing soda + 1 1/2 cup kerosene + 1 Tblsp powder detergent*	Rinse inside of tank and flush small amount of solution through system. Let stand at least 2 hours. Flush system and rinse with clean water.
Other herbicides (e.g. Lasso, simazine)	1/4 lb powder detergent*	1 Tblsp powder detergent*	Agitate solution 10-15 minutes, flush through system. Rinse with clean water.

*Liquid detergent may be used in place of powder detergent.

**Modified from "The Safe and Effective Use of Pesticides" University of California, Publication 3324.

Pressure gauges—Fluid pressure in the spray system is monitored by a pressure gauge. The gauge measures spray pressure through the nozzles when located between the pressure regulator and the spray nozzles. Consequently, a change in pressure can mean a potential malfunction. Pressure gauges should be in good working condition and properly calibrated.

Fittings and clamps—A frequent source of leaks is loose or cracked fittings. Fittings and clamps need to be snug prior to putting the system under pressure and pumping liquid. Once the system is under pressure, check for leaks.

Nozzle tips and strainers—These should be checked to make sure they are not plugged. The spray tip should be replaced when wear causes flow to exceed that of a new tip by 10 percent. Worn nozzles mean more chemical sprayed and often an irregular spray pattern. Nozzle openings may change especially when abrasive formulations, i.e. wettable powders, are used frequently.

Cleaning Spray Equipment

Cleaning pesticide spray equipment involves flushing out the spray system with clean water. Several washes using a small volume (up to 10 percent of the spray tank capacity) are better than merely filling the spray tank once with clean water. It is nearly impossible to remove all traces of pesticides from spray equipment. However, careful cleaning and flushing will remove all but insignificant amounts. Equipment should be cleaned at the end of each day of use unless the same pesticide will be used over a several-day period. Proper cleaning will prevent corrosion of spray

components and will eliminate the possibility of cross-contamination when changing from one pesticide to another.

Cleaning and flushing the spray system can occur in the field if a source of fresh water is readily available. The outside of the sprayer should also be washed. For this purpose applicators are encouraged to have a source of water on the sprayer in order to rinse down the sprayer and wash out the tank in the field. When washing the sprayer, do not create standing puddles that might be accessible to children, pets, livestock or wildlife.

A question commonly arises of what to do with the equipment rinse water. By cleaning and flushing the sprayer in the field, the rinse water can be applied in the field where the product was intended to be used. This would be disposing of pesticide waste in accordance with label directions.

When a pesticide treatment is complete or a different type of pesticide will be applied, the sprayer, especially the tank, should be decontaminated with a cleaning solution. The appropriate solution depends on the pesticide used. Recommendations for various pesticides are listed in Table 1.

Follow the proper cleaning solution treatment. The spray system should be flushed with fresh water. At this time, nozzle tips and screens can be removed and cleaned in a detergent solution or kerosene. Applicators must wear rubber gloves when removing and cleaning nozzles. If a spray tip is clogged, use compressed air, a soft-bristled brush (such as an old toothbrush) or wooden toothpick to remove stuck objects. Use extreme care with soft-tip materials such as

plastic because the slightest damage to the nozzle orifice can cause both an increased flow rate and poor spray distribution. Never use a metal object to clean nozzle tips or screens and never place the nozzle tips or screens close to the mouth to blow clogged particles free. Small amounts of pesticide residue can blow back into your face.

At the end of the spray season, certain steps must be taken to assure that equipment will be in good working condition the following spring.

- **Decontaminate and thoroughly clean inside and outside of sprayer.** Use procedures previously listed for cleaning pesticides out of the tank. Scrub external parts of the sprayer. Use detergent or ammonia solution to decontaminate external surfaces. Rinse outside of sprayer with clean water.
- **Drain sprayer.** Drain all spray parts that are subject to freezing.
- **Remove and clean nozzles, nozzle strainers, filter screens and seals.** Place these components in a clean plastic bag or glass jar to keep them free of dirt. Plug nozzle outlets to prevent entry of dirt, debris or rodents.
- **Maintain pump.** If the pump does not contain rubber parts, put two tablespoons of oil in each inlet and outlet connection. If the pump has rubber parts, use antifreeze with a radiator rust-inhibitor instead of oil. Rotate the pump shaft by hand to coat the inside surfaces. An alternative is to remove the pump and place in warm storage.

- **Order replacement parts early.** Make a list and order all parts needing replacement and have them available for the next spraying season.
- **Store sprayer under cover.** Spray equipment should be stored where it will not be damaged by livestock or by moving other equipment around. It is recommended to cover sprayers with a tarp to prevent entry of dirt, insects and rodents. It is especially important to cover polyethylene tanks to prevent deterioration by sunlight.

REMEMBER:

The hazards of working with pesticides are greatly reduced when you wear protective clothing. Consult the pesticide label or your county Extension office for information on selection of proper protective clothing and safety equipment.

Suspect pesticide poisoning if an applicator or field worker becomes sick after working around pesticides. In the event the victim exhibits toxic symptoms (severe headache, dizziness, nausea, diarrhea), immediately call a physician or one of the numbers listed below. You need the pesticide label or at least the name of the pesticide used when you make the call.

Montana Poison Control Information Center

1-800-525-5042

Rocky Mountain Poison Center

1-800-332-3073

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